THE AMERICAN
JOURNAL OF PHARMACY

VOL. 106 JULY, 1934 No. 7

SELECTED EDITORIAL

ENGLAND AND THE ENGLISH LANGUAGE*

THOUGH we may live among those who speak our language (and our language is English), and we may read from our best authors, our oldest writers, yet few of us know the origin of English so often idiomatically referred to as "the King's English."

Centuries ago, two brothers, adventurers both of an obscure Saxon tribe, raised their ensign of the White Horse on British land. They were welcomed by the then reigning British monarch. They were considered friendly allies and were called Saxons because they carried crooked swords or seax. Their trade was battle. Their glory was pillage. They baffled the strong and annihilated the weak. They showed the spiritless how a few could conquer many. One of the brothers founded the kingdom of Kent, then the kingdom of South Saxons, and still later the kingdom of West Saxons. Then the tribe of the Angles depopulated their native province and flocked to the fertile island, led by the greatest foeman the British knew and often referred to as the "Flame Bearer," or the "Destroyer." The qualities of the Saxons were hateful to the Britons, even their fair complexions. Already the name of Britain had disappeared among the Woodens who referred to England as "Saxony beyond the Sea" or "West Saxon-Land."

Eight separate kingdoms were raised on the soil of Britain. It became a movable surface of fraternal wars and baffled rivals, and at the end of five centuries the Saxons fell prostrate before a stronger race. But of all the accidents and the fortunes of the Saxon dynasty, not the least surprising is that an obscure town in the duchy of Sleswick, Anglen, is commemorated by the transference of its name to one of the great European nations. The Angles or Engles have given their denomination to the land of Britain—Engleland is England, and

*Reprinted from *The Medical Record*, July 4, 1934, page 54.

the Engles are the British. Egbert became the first monarch of England and was the first to issue the decree, "This kingdom of Britain shall be called England."

Johnson pronounced it impossible to ascertain when our speech ceased to be Saxon and began to be English. The antiquarian lore of Ritson, the elegant researches of Ellis, the diligence of Shoron Turner and the poetic fervor of Campbell, and more recent names skilled in Saxon lore have furnished different hypotheses, conjectures and refutations.

The Saxon language was originally tinctured with Latin terms by the ecclesiastics and embodied some fashionable Normanisms from the court of the "Confessor." Roughly, one may consider that when the Norman-French killed Harold, his language, with whatever pomp it had, was coffined in the same grave, for after the conquest the miserable Saxons lost their "book craft." There was practically nothing more written in their language. A few pietists still lingered in occasional homilies, and a solitary charter has been perpetuated; but the style was already changed and as a literary language the Anglo-Saxon had forever departed. It has sunk to the people and they treated the ancient idiom after their own fashion.

The language of books served not simple men: laying aside its inflections, inversions and arbitrary construction, they chose a shorter and more direct conveyance of their thoughts and only kept to a language fitted to the business of daily life. This getting away from the encumbrances of the Anglo-Saxon we may consider formed the obscure beginning of the English language. First the inversions were simplified, then the inflections dropped and the final *e* became mute and, at length, ejected. Ancient words were changed and Norman neologisms introduced. The transition was not uniform; each shire developed its own idiom and the country was Babelonic with varied dialects.

Some English writers wrote in French, others in Latin, while more inclined to verse and prose in the dialect of their own shire. The "Saxon Chronicle" which closed 1155, had been continued at progressive intervals by various writers. Even this most authentic document of Anglo-Saxon diction exhibited remarkable variations of style, corruptions of idiom, inflections and orthography in its downward course through time, which demonstrates the confusion of the organization of the language that was to be. All this took place about the

time that Layamon, in 1180, made an English version of Wace's "Brut." The language changed quickly from this state of disorganization—systems developed. An ecclesiastic, critical and refined writer, paraphrased the "Gospel-Histories." He doubled the consonant after a short vowel in order to regulate pronunciation. He wrote "brother" as "brotherr" and "after" as "afterr." At this period began stylists, each adding, but rarely subtracting, to the language. Robert of Glouster wrote his "Chronicle" in 1280, when the language was "Ingliss" and from this period to the Reformation the language has been termed "Middle English" by philologists.

If, in looking back, we, by any chance, feel that English of that period was considered a finished product and represented a cultured effort of the intellectuals, we need only contemplate the comment of Richard Rolle (the Hermit of Hampole). He translated the earliest versions of the "Psalms" into English from Latin for "the unlettered men of Englande, who can only understand English." The language was making slow progress, and in 1365 the monk Hegden complained bitterly: "There is no nation whose children are compelled to leave their own language as we have, since the Normans came into England. A gentleman's child must speak French from the time he is rocked in a cradle."

Twenty years later the Latin "Chronicle" of Hegden was translated into English by John de Trevisa. In this passage the translator furnishes the important observation, that, "since this was written, a revolution had occurred through our Grammar schools: the patriotic efforts of Sir John Cornewaile in teaching his pupils to construe their Latin into English, had been generally adopted; so that now, the year of our Lorde 1385, in all the Grammar schools of England, children learneth Frensche, and construeth and learneth in Englische." Henry the Fifth and his father, Henry the Fourth, wrote their wills in English (when the nobles employed French or Latin for the same purpose), in order to more officially acknowledge that English was no longer a dialect of the untutored and unlettered, but was the acknowledged language of the English people.

We may consider, therefore, that the language of the English speaking peoples stepped out of its dialect petticoat in 1385.

H. L. H.

ORIGINAL ARTICLES

CINCHONINE SOLUBILITY

By Robt. A. Hatcher

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A NOTE on the solubility of cinchonine and some of the difficulties of determining it was presented in 1902. (1) At that time the sulphate of cinchonine was dissolved in distilled water and specimens of the solution were diluted to the point where no turbidity was perceptible when the solution had stood during 24 hours at room temperature after the addition of a slight excess of NaOH. The results indicated that 1 part of cinchonine was soluble in approximately 23,000 parts of water. This method is open to the objection that one does not know what effect traces of NaOH have on the solubility of the alkaloid.

The U. S. P. VII states that cinchonine is soluble at 15 degrees in 3760 parts of water, and in 163 parts of chloroform; that the sulphate is soluble in 10 parts of alcohol; and in 78 parts [about 52 parts W/V] of choloroform. Merck's Index (2) states that cinchonine is soluble in about 3800 parts of water and in 280 parts of choloroform; that the sulphate is soluble at 25 degrees in 12.5 of alcohol, and in 47 parts [about 31 parts W/V] of chloroform. (Cf. table, p. 248.)

We have frequently investigated the fate of alkaloids in the animal organism, and have found chloroform the best solvent for extraction of the bases from alkaline aqueous extracts of tissues. In such cases the actual and relative solubilities of the bases and their salts in alkaline aqueous solution and in chloroform are important.

The greater number of authors disregard the percentage of alcohol present in chloroform when determining the solubilities of various alkaloids, and with many of which this is a matter of minor importance; with some—e. g., morphine, cinchonine, cinchonine sulphate—it is of great importance. The purer the chloroform used for separating alkaloids from extracts of animal tissues, the purer is the alkaloidal residue left on distilling the choloroform; and the presence of even small amounts of alcohol in the chloroform increases the impurity of the residue greatly. Hence it is important in any case to know the percentage of alcohol in the chloroform used, and the solu-

bilities of the alkaloid and its salts in chloroform containing varying percentages of alcohol.

Schaefer (3) dissolved many cinchona alkaloids and salts by shaking them with a large excess of water at 25 degrees for several days. He states that they are more soluble at 25 degrees if they are dissolved in hot water and allowed to cool, than if shaken with cold water alone; that the solubilities in water vary greatly according to age and method of manufacture. One specimen of cinchonine was soluble in 8800 parts of water.

Solubility of Cinchonine (Base) in Distilled Water

As stated in my previous communication, it is difficult to form a saturated solution by shaking finely powdered cinchonine with water, since the alkaloid adheres to the glass. I have therefore used the following methods for preparing saturated solutions:

1. Solution by simple agitation with water at 25 degrees (method of U. S. P. X).
2. Solution by means of heat, and cooling.
3. Solution of the sulphate and precipitation with sodium hydrate (as described in my previous communication).
4. Solution by shaking the choloroformic solution with water, and expelling the choloroform over a water bath, or, preferably, in a partial vacuum.

The concentration of each of the solutions was then determined by means of Valser's reagent in the following way:

Fluorescence is produced when 0.1 cc. of Valser's reagent is added to 5 cc. of a solution of 1 part of cinchonine base in 2,000,000 parts of 0.5 per cent. sulphuric acid at 25 degrees C. The reaction is intensified by cooling, lessened by warming. Cinchonine may be determined quantitatively with an error of not more than 5 per cent., by diluting a solution with 0.5 per cent. sulphuric acid until it affords a reaction identical with that afforded by a solution known to contain 1 part in 2,000,000. Valser's reagent is made by dissolving 10 grams of potassium iodide in 100 cc. of distilled water, and in this dissolving 14 grams of mercuric iodide. The use of Valser's reagent and more or less similar, alkaloidal precipitants is discussed by Travell.(4)

In some cases the amount of cinchonine present was also determined by means of Koppeschaar's solution. The technic developed in this laboratory, which has not been published, may be described

briefly as follows: A measured amount of bromine solution is placed in each of several test tubes, and to each is added a measured amount of a solution of the alkaloid of known concentration, increasing by small percentages until the bromine is just neutralized. The end-point is shown roughly by the disappearance of color of bromine; more accurately by the addition of a few drops of chloroform, or by the addition of a trace of apomorphine hydrochloride, which affords a pink color with a trace of free bromine. The volume of the solution of cinchonine of known concentration required to neutralize 1 cc. of the bromine solution having been determined, a similar determination is made with the solution of unknown concentration under nearly similar conditions, and its concentration is then calculated readily.*

1. *Solution by simple agitation with water.* One hundred milligrams of cinchonine base added to 200 cc. of distilled water in a Pyrex flask, was shaken frequently during two days. The tests of the filtrate with Valser's reagent and Koppeschaar's solution were in close agreement, indicating a concentration of 1 part of cinchonine in about 30,000. The undissolved residue weighed 93 mgm. In a nearly similar experiment 50 mgm. of cinchonine in fine powder, added to 100 cc. of distilled water in a Pyrex glass-stoppered cylinder, was shaken frequently during three days, after which it was filtered through a hard paper filter. The results indicated a concentration of 1 in 50,000. The dried residue weighed 49.3 mgm.

It is difficult to obtain perfectly clear filtrates, hence relatively large differences are seen in different experiments, but the actual difference in the amount dissolved is little more than 1 mgm. in 100 cc., and even this difference is probably due mainly to differences in the amounts of undissolved alkaloid which remain suspended, and even pass through a hard paper filter.

2. *Solution by means of heat, and cooling.* In one experiment 100 mgm. of cinchonine base in 200 cc. of distilled water in a Pyrex flask was heated during 2 hours on a boiling water bath; the solution was filtered while hot and the filtrate was cooled to 24 degrees during about 48 hours, resulting in some precipitation. Tests of the filtrate of the cooled solution with Valser's reagent and Koppeschaar's solution indicated, in fairly close agreement, that the cooled filtrate contained 1 part in 20,000 parts of water. On cooling 191 cc. of hot solution, the precipitate weighed 9.37 mgm.; 188 cc. of the cooled filtrate

*I am indebted to Mr. Robert L. Hatcher for the estimations with Koppeschaar's solution.

contained 9.4 mgm., hence the hot solution had contained 1 part in about 10,100 parts of water. The portion insoluble in hot water weighed 80.5 mgm., the total amount recovered, including that from washings of the filter, being 99.27 mgm.

Tests were made to determine the effect of heating, if any, on the stability of cinchonine. For this purpose 50 mgm. of cinchonine base in 250 cc. of 0.5 per cent. sulphuric acid. and 50 mgm. of the base in 250 cc. of distilled water, were heated on a water bath during 1 hour. These were cooled, enough sulphuric acid was added to the second to dissolve the alkaloid, and distilled water was added to make up for that lost by evaporation. Tests of both solutions by Valser's reagent and by Koppeschaar's solution indicated that there was no change in reaction to those reagents as the result of heating.

3. *Solution of the sulphate and precipitation with sodium hydrate.* Cinchonine sulphate, 250 mgm., was dissolved in 1000 cc. of distilled water, 100 mgm. of sodium hydrate was added; and the mixture was shaken vigorously for 5 minutes. One portion was filtered immediately after shaking 5 minutes, one after 1 hour, and one after the mixture had stood 3 days with frequent shaking.

The concentrations were determined by means of Valser's reagent alone. After 5 minutes the concentration of the slightly cloudy filtrate was 1 in 80,000; after 1 hour the concentration of the slightly cloudy first part of that filtrate was 1 in 80,000; the concentration of the nearly clear second part of that filtrate was 1 in 100,000; after 3 days the following portions of the filtrate were examined: The first 15 cc., the next 240 cc., the next 200 cc. and the last 50 cc. The first two were slightly cloudy; the last was apparently clear, but this was in small volume and a trace of suspended alkaloid might have escaped detection. The concentration of each of the first three was 1 in 100,000; that of the last, 1 in 133,000, the difference probably being due to traces of cinchonine powder that passed through the first three filters. The experiment was repeated with results not greatly different.

4. *Solution by shaking the chloroformic solution with water, etc.* In order to distribute an excess of cinchonine in suspension in water, the following method was employed: Fifty milligrams of cinchonine base was dissolved in 15 cc. of chloroform; the chloroformic solution was shaken with 400 cc. of distilled water; the solution was evaporated on a water bath to 250 cc., all of the chloroform being expelled. A part of the solution was filtered while warm, the remainder after it

had cooled. These filtrates were tested by Valser's reagent and Koppeschaar's solution; the results indicated concentrations of from 1 in 13,000 to 1 in 15,000; no precipitation having occurred during cooling. Having found that previous solution in hot water increased the subsequent solubility in cold water, a nearly similar technic was used except that no heat was employed. In this experiment 50 mgm. of cinchonine base was dissolved in 20 cc. of chloroform. The chloroformic solution was added to 500 cc. of distilled water and the mixture was shaken vigorously during 5 minutes. This was transferred to a porcelain evaporating dish which was placed in a dessicator and allowed to remain under reduced pressure during 24 hours, at about 26 degrees, after which no trace of chloroform could be detected. The solution was filtered through a hard paper filter in two portions; both portions of filtrate were apparently clear. The test with Valser's reagent indicated that the concentration of each filtrate was 1 in 26,600.

Solubility of Cinchonine Sulphate in Chloroform

Two specimens of chloroform were deprived of nearly all their alcohol by shaking with distilled water, after which they were cooled to 8 degrees during about 24 hours, and filtered. The specific gravity of the filtrate of the first specimen, which contained only a trace of alcohol, was 1.4862 at 25 degrees C., that of the second, which contained about 0.15 per cent. of alcohol, was 1.4841. Alcohol was added to each of three portions of the filtrate of the first specimen in concentrations of 0.5, 1.0 and 2.16 per cent. An excess of cinchonine sulphate was added to each of these five specimens, and they were allowed to stand about 24 hours or longer with frequent shaking, though saturation was almost complete in a few minutes; the solutions were filtered, the filtrates were weighed; the chloroform was expelled by evaporation; and the residues were weighed. The table shows the solubilities.

Table showing solubility of cinchonine sulphate in chloroform having varying percentages of alcohol, at approximately 25 degrees C.

Alcohol	Specific Gravity	Solubility
trace	1.4862	1–878.7
0.15 per cent.	1.4841	1–470.9
0.5 " " (U. S. P. X)	1.4797	1–112.3
1.0 " " (U. S. P. X)	1.4732	1–47.0
2.16 " "	1.4583	1–20.45

Summary

The solubility of cinchonine in water varies widely depending on the technic employed; but so far as I have been able to learn, no recent investigator has observed a greater solubility than 1 in 20,000 without the use of heat. A large volume of solution should be prepared because traces of the undissolved alkaloid may pass through ordinary hard paper filter, and escape detection when a thin layer of the solution is examined. A convenient method of preparing a saturated solution is described. Cinchonine is very slightly soluble in distilled water at 25 degrees. The solubility of cinchonine sulphate in chloroform U. S. P. X varies widely with the permissible percentage of alcohol present. Every statement of the solubility of a substance in chlorform should include the specific gravity of the latter and the percentage of alcohol which it contains. The method of determining the solubility of slightly soluble substances should be stated.

REFERENCES

(1) Hatcher: *Am. J. Pharm.*, 74, 134, 136, 1902.
(2) *Merck's Index*, 4th Edition, 170, 1930.
(3) Schaefer: *Am. J. Pharm.*, 82, 175, 1910.
(4) Travell: *J. Pharm. Assn.* (In press.)

Castellani's Test for Albuminuria

Hoffmann gives Castellani's test for albuminuria, which is as follows: The filtered urine, 5 cc., is placed in a test tube and 1.5 cc. of liquefied phenol is added by pouring it slowly down the sides of the tube by means of a pipet. The liquefied phenol will collect at the bottom of the tube. If within two minutes a definite white ring forms where the two liquids come in contact the test is considered positive; namely, the urine contains albumin. The author has found that it is quite as sensitive as other similar methods and that it always shows the reaction in a clear and distinct way. He has never seen false positive reactions in the negative urines that have been examined as controls. He finds the method exceedingly useful for the daily routine work of the practitioner and still more for hospitals and laboratories. It is also an easy control for other tests in doubtful cases.—*Journal of Tropical Medicine and Hygiene, London, 37:* 97-112 (April 2) 1934 (through *Jour. A. M. A.*).

THE INTERDEPENDENCE OF THE VARIOUS DEPARTMENTS OF SCIENCE*

By Oscar W. Bethea, Ph. M., M. D.

I TAKE it for granted that all of these young ladies and gentlemen to whom we do honor tonight are directly or indirectly fellow laborers in a common cause.

All science is united in an effort to provide that the peoples of today, and of the days to come, may live a freer, happier and more wholesome existence. Were it not so, science would have no legitimate claim to the loyalty, much less the devotion, of the world of men.

It has been said that man is the only animal created to stand alone with his face toward heaven; our accepted duty is to see that he realizes this heritage.

This great country of ours was founded that each individual might have a full measure of life, liberty and the pursuit of happiness, but we know that without good health life may prove a burden, liberty a travesty, and the pursuit of happiness take rank with the storied odysseys of the Ponce de Leon and of Billy Patterson.

Every child—every member of the human race who falls short of the full measure of well-being today is a challenge to science—and an impeachment.

We have come a long way in the right direction. Scarce three centuries ago the average duration of human life was twenty years, now it is sixty. As the age of productivity, now as then, begins at about fifteen, we now have an average period of useful endeavor of forty-five years as against the former five, an increase of 900 per cent. in economic value. It is our mission to make this period longer, more productive and happier. No one department of science carries or could carry this entire responsibility. Our greatest hope for the future lies in a frank recognition of the interdependence of those most concerned.

The botanist who discovers a new plant of value, the chemist who synthesizes a new compound, the pharmacologist who delves into the secrets of nature and brings to light hidden possibilities for good, the therapist who gathers together the results of the work of these, his fellow-laborers, and proves their practical value for the relief of suffering humanity—each is a cog in the great wheel of progress.

*Address delivered at the 1934 Commencement Exercises of the Philadelphia College of Pharmacy and Science.

It has been estimated that the chemists of today, in the development of new drugs, have forged so far ahead that they have now more than 5000 compounds ready for the pharmacologists and the therapists to use in the evolution of medicine. Among these there may be specifics greater than quinine and arsphenamine; anesthetics beyond the present dream of the anesthetist; and anodynes that may cause morphine to become of historic interest only.

Man has been classed as a gregarious animal. The first clearly readable traces of the genus homo indicate the formation of groups—the acknowledgment of interdependence.

In the final count as to the extent to which our lives have been worth while, we shall be judged not only by how we have performed our self-appointed tasks but as to how well we have functioned as a part of the whole.

I once heard a lecturer describe an old-time canning factory. The laborers were lined up before slow-moving belts on which were placed the work assigned and each performed his part as the material passed. For example, one would put in the fruit, the next the syrup, the next the spices, and so on till the finished product was ready for the market. If one individual failed to perform his special task the whole was ruined.

Let us envisage our rôles in life as partaking somewhat of this mutual dependence. It raises the status of the labor of each to the dignity of an essential part of the whole and will be an incentive to continued effort. It brings to us the realization that not only are we helping others, but that others are helping us.

Sometimes co-operation does not realize this ideal.

Pushmataha, the last great native chief of the Choctaw nation, once went with a party of sub-chiefs on an official visit to Washington and part of their entertainment was a great banquet. Oysters was to be the first course and when they took their seats at the table only the pepper sauces were before them. These native sons were unaccustomed to the procedures of their white brethren but they thought that they knew what to do with bottles. One of the braves reached over, picked up a bottle of the fiery liquid, took an enthusiastic swallow before realizing his mistake but replaced the bottle without a change of expression. The old chief looking over and seeing the reflex tears welling up in the eyes of the stoical young man, said: "My brother, why do you weep?" The brave replied: "I weep at the memory of my grandfather who died when I was a child." Pushmataha then

reached over, took a generous draught from the same bottle. Not a muscle moved in his old face, but the tears started coursing down his furrowed cheeks. The young brave looked over and in gentle accents asked: "My brother, why do you weep?" To which the old man replied: "I weep fool that you did not die when your grandfather did."

One of the most beautiful characteristics of the men of science is the frankness with which they give others the benefit of their failures as well as of their successes.

The finest example of co-operation in an atmosphere of mutual respect that I have ever witnessed is in the Revision Committee of the U. S. Pharmacopœia. These selected representatives of the different departments of science meet together day after day, each contributing his quota of information and advice from his store of specialized knowledge yet each seeming to realize his own limitations and inability to incompass the whole, and respecting the particular equipment and sincerity of purpose of those associated with him. In the four years of meetings that I have attended I have never heard an unkind or disrespectful word spoken nor seen an individual fail to yield gracefully to majority opinion.

Young ladies and gentlemen you have obtained at school what you sought—with sincerity of purpose. You will get out of life what you go after—with adequately sustained enthusiasm. It is said that Mohammed resting in the shade of his favorite date-palm, near a well in the suburbs of Medina, was watching the women bring their pitchers for water. It suddenly occurred to him that each carried away only the water she came after. In other words, the women with a pint pitcher might carry away a pint, but no more, while one with a pitcher holding a gallon carried away a gallon but, a gallon only. You have filled your pitchers here at this fountain of knowledge, you will continue in after life to carry them home, full if you wish, but not a drop beyond.

I often think of Jimmie Wagner. When I was a young clerk in a drug store he started to work in the express office nearby. The other boys in his department were soon spreading the joke that Jim was writing down every name, every rate, and everything else that was not already familiar to him that came up during each day's business. It was also rumored that he had started a collection of rate-books and geographies and maps and globes—it was quite a joke on this awkward freckled-faced country boy. When I left, my old friends in the

express office were all still there—as was—that is, except Jim, he was general superintendent of the division.

In my experience, as manager of a wholesale drug business, a part of my work was to pass on credit—to decide as to what firms or individuals we would extend an open account and for how much. If we refused a new prospect and that firm or man made good, we had lost an opportunity. If we extended credit and that particular firm or individual failed we were out good hard-earned dollars. So I naturally became more and more interested in analyzing the "Whys" and "Wherefores" of success and failure, and let me tell you this as a finished statement of fact, I never knew a person to fail to make good unless there was a definite tangible reason, and usually the fault lay in the individual himself.

If I had the gift of prophecy and could promise you young ladies and gentlemen that ten or twenty years from now would find you healthy, happy, prosperous, honored, eminent, I imagine that some of you would feel a measure of relief, that more smiles would light up some of these faces that tonight are peering rather anxiously into the future. I can promise you that and more, if you want those things enough. Enough to bend every energy, to direct every effort toward their attainment in a continuous whole-hearted endeavor. I do not mean that any of you will have an uninterrupted progress. You will frequently stumble and fall. But remember, it is not the fall that counts on the road to success, it is the staying down. It is not going under the water that drowns one, it is staying under too long.

Let me make a confession. I have never analyzed one of my failures without realizing that the fault was my own.

You have chosen a life-work that peculiarly requires unremitting effort and concentration of purpose. Science is a jealous mistress and will not brook a rival.

Recently I was making a case history of a prominent physician patient. One of the first questions asked was: "How long have you been married?" His sweet-faced little wife spoke up—there was a pathetic catch in her voice as she said: "Doctor, don't ask him. He doesn't know. He thinks that he is married to medicine." I had often wondered at his success—I do not wonder longer.

Not only must our devotion be whole-hearted to the high calling that is ours, but we must be ever on the qui vive. Times change and we must change with them. My idea of this is typified by the old liverymen who are now running garages. Many a man of science is

still figuratively sitting in front of his old livery stable trying to rent out horses and buggies. Let me offer for your emulation the old negro Baptist preacher who, when the neighboring creek ran dry, turned Methodist.

Browning sensed our restlessness, our lack of fixity of purpose, when he said: "Does he write, he fain would paint a picture—does he paint, he fain would write a book."

At one time in ancient Egypt it was the law that when a physician departed from established custom he was held responsible for the results. If the patient lost an eye, the physician was deprived of one of his. If the patient died, the physician was sent with him into the great beyond. As a result, medical science stagnated in Egypt through countless centuries.

Every step of the world's progress has been the result of some one's deviating from established usage.

Bryan once said: "When one man only sees a thing, he is a fanatic; when several see it, he is an enthusiast; when all see it, he is a hero."

Think of the hoots and jeers that followed the first men who ever straddled a horse, turned a wheel, spread a sail or even donned a garment.

Myrtle Ried with poetic license sang: "He was a brave man who first discovered sleep, but what a reward was his."

I would like to urge on this young generation in the field of scientific endeavor that they not only avail themselves of the accumulated knowledge of the past ages, but maintain a courage that wills them to forsake the beaten paths, when wisdom dictates, and venture forth into the unexplored. You may not discover a new world, but it may be yours to improve some smaller or larger fraction of this old one.

Do not discard that which is time-honored because of its age, but remember that white hair may cover a still empty head, and the very best of yesterday may hardly suffice to meet the bare requirements of tomorrow.

And now, young ladies and gentlemen, if I could make for you one final wish that would grow to fruition, it would be for a deep and abiding loyalty.

One that would cover your immediate associates in the labors just past, that in the time to come your lives might be mutually enriched by the continued joys of the priceless friendships begun in

the comradery of the campus and hallowed by the benediction of passing years well spent.

A loyalty to the Class of 1934 that will make this spirit a motivating influence ever directing you to higher and better things.

A loyalty to your Alma Mater that will send you out into the world of endeavor as apostles of her great past, her greater present, and her untold possibilities for greatness in the future. May you never hear her name in the after years without a quickening of the pulse, a brightening of the fires of enthusiasm and a sense of rededication to the service for which she equipped you.

But I would wish for you an even more comprehensive loyalty. One that embraces the entire field of scientific endeavor, and even beyond this, the world of suffering humanity. One that leads up in the last analysis to the brotherhood of man and the fatherhood of God. That in the march of world progress you may ably lead and direct, should such be your portion, or, if in the rank and file, that you keep step in cheerful, efficient harmony.

That your lives may be such that when you go over the crest of the hill and pass down into the valley where the shadows of even fall—where the genial warmth of summer's sun gives way to the chill of autumn's frost, you may, like ripe fruit, drop into the lap of mother earth or be gently garnered—not harshly plucked—in death mature.

ON THE TRAIL OF NICOTINE DURING THE SMOKING PROCESS*

By J. Howard Graham

Temple University Pharmacy School

ALL SMOKERS are interested in the question, "What becomes of the nicotine content of tobacco when it is smoked?" Many believe that it is burned completely during the smoking process. Some believe that the smudge collected on a white handkerchief contains none. Non-inhalers, so-called, are confident that no nicotine gets into the system. Yet an advertisement reads, "On its presence in tobaccos are based all the evils of smoking. Many actual physical ills and more deficiencies in mental and physical capacities are directly traceable to the constant absorption of nicotine in tobacco." (47) This and other types of warnings naturally give the smokers very much concern. In order to throw a little light upon this important question, both to smoker and non-smoker, in a scientific way, the writer presents the following review of chemical work done principally by Europeans, during the last twenty-five years; but at the same time calls attention through the literature, to the very considerable activity along this line during the last three years.

PROPERTIES.—Nicotine, $C_{10}H_{14}N_2$, is an alkaloid, a derivative of pyridin. It was isolated from tobacco by Posselt in 1828. Alkaloids are the most powerful of all the active principles of plant drugs. Nicotine is one of at least four alkaloids found to the extent of from 1 to 7 per cent. in tobacco leaves. These alkaloids are very poisonous and it is their extract that is so efficacious as insecticides.(12) The fatal dose of the pure alkaloid is about 6 mgs. In South Africa, farmers often kill snakes with the pipe-oil which accumulates in the pipe.(5) In the tobacco, the nicotine is partly, at least, combined with malic and citric acids. Smoking is presumed by some to decompose the nicotine compounds to such an extent that the characteristic physiological effects of the alkaloid are not produced. Pure nicotine is a colorless fluid, but exposure to the air turns it brown, giving off at the same time the strong tobacco odor so offensive in uncleaned pipes and in stale partly smoked cigars and cigarettes.

*Read at the Fifty-seventh Annual Meeting of Pennsylvania Pharmaceutical Association, June 21, 1934.

APPARATUS.—The chemist's method of research along the line in question depends upon the making of apparatus which imitates the smoker very closely. In doing this he has made apparatus of glass, supplied with collecting chambers, and aspirators for controlling the air supply, and consequent burning time of the tobacco. Each investigator has carefully improved upon his predecessor's apparatus and manner of determination of the nicotine where sought. Generally the method of Pfyl and Schmitt (37) with various modifications, has been used.

THE DISTILLATE.—As to the smudge which one may get by smoking, and breathing upon a white handkerchief, it naturally contains a little of that which the chemist can find in his collecting apparatus, which is free and combined nicotine, pyridin, ammonia and tarry matter. All investigators find nicotine in the smoke of all tobaccos, whether in cigarette, loose, or in cigar. All investigators find nicotine in the stumps and in the distillates. The chemist employs a purifying train to collect the products of burning. With the smoker, the stump, throat, and nasal cavities simulate this purifying train.

EXPERIMENTAL.—The chemist collects his nicotine by physical and by chemical means. Physical means employ the use of cotton pledgets, glass wool, silica gel and activated carbon. Chemical means employ tannin, sulphuric, picric and silicotungstic acids. When the chemists' materials are borrowed to be placed into the tips of cigarettes to collect the nicotine, the manufacturers' claims fail to be substantiated fully.(44) "Nicotip," a commercial substance utilizing cotton, has about 67.5 per cent. efficiency along this line, much better than silica gel, for instance, but most of these materials must be constantly renewed for efficiency.(36) Chemical means are employed commercially with an idea of eliminating the irritating effects of smoking, to wit, the use of 3,6-diamino-10 methylacridinium chloride.(46)

It has been shown that smokers of cigarettes and cigars average two puffs per minute with an average smoking time of two seconds and a volume production of 40-50 c. c.(45) When tobacco is burned by an uninterrupted air current, about 10 per cent. of the nicotine is lost. Rapidly burning cigarettes (9-10 minutes against 17-20 minutes) give twice as much nicotine in the smoke as slow burning.(32) One recent investigator, using five varieties of tobacco, recovered 93.5 per cent. of nicotine in the smoke.(33)

All investigators agree upon the nicotine content of smoke. Their results are fairly consistent when personal equations of the workers, different types of tobacco, and the various apparatus are considered. Not only have chemical tests been employed for estimating nicotine content, but biological tests as well, such as the effect on blood pressure (4) and the type of contraction of the stripes of small intestines of puppies (6) where physiological means check the chemical estimations. Thus two brands of cigarettes: (5)

Wgt. cigarette grams	Water %	Ash %	Nicotine (dry) %	Wgt. Nicotine per cigarette mg.	Amount inhaled per cigarette mg.
1.0	15.0	15.6	2.2	19	6
1.3	9.5	15.7	1.5	18	8

These results claim an average of 0.7 per cent. of nicotine in the smoke based on the total weight of tobacco. Another investigator (8) claims an average of 0.573 per cent. nicotine. He says that, of the nicotine in the tobacco, about 14 per cent. to 33 per cent. appears in the smoke puffed. The maximum amount of nicotine retained in the body is calculated as 36 mg. per hour in inhaling, and 27.5 mg. per hour in puffing. This dose of nicotine would require a high tolerance on the part of the subject in order to escape the disagreeable symptoms and would account for the illness of the novice as a result of smoking. It is undoubtedly true that in most cases a large per cent. of the nicotine is expectorated before being absorbed, therefore the usual dose of nicotine may be very much less than the amount calculated above. The same chemist (9) using an electrical precipitating method found that the smoke drawn into the mouth had a weight of 9.59 per cent. of the tobacco burned. That while puffing, 66.7 per cent. of the smoke is retained in the body of the subject, and while inhaling, 88.2 per cent. is retained. Some of this leaves the subject as spittle.

Another investigator (10) found that smoke from moist cigars contains 50 to 75 per cent. more nicotine than smoke from dry cigars. Seven cigarettes which weighed 5 g. and contained 0.25 g. nicotine gave smoke which contained 0.04 g. nicotine of which 0.007 g. is calculated as absorbed by the mouth-smoker, and 0.035 g. by the smoker who inhales.

Another result is interesting (35) in that when 10 g. of tobacco were burned, the smoke yielded 72.2 mg. of nicotine, 5.0 mg. of pyridin and 65.8 mg. of ammonia. When cigarette tobacco contains 1 per

cent. or more of nicotine, the nicotine of the smoke increases proportionately with the nicotine content of the tobacco.(44) The main current from a cigarette carries about 25 per cent. of the nicotine into the mouth,(13) at least 50 per cent. passing into the air; from a cigar 60 per cent. reaches the mouth. The main current from cigarettes of light tobaccos contain markedly less nicotine than that from dark tobaccos.

NICOTINE IN THE BODY.—The fate of nicotine in the body after smoking has been examined by two methods: (11) subcutaneous injection of nicotine into guinea pigs, furnished after six hours the greatest concentration in the urine, with considerable amounts in the intestines and detectable amounts in the liver and lungs. After parenteral introduction, nicotine appears in the urine within one and one-half hours and continues to be eliminated by the kidneys up to ten hours. After smoking, considerable amounts of nicotine quickly appear in the urine, the time of elimination being the same regardless of the smoking habits of the individual, but during the night the body becomes nicotine free again.

Nicotine has been demonstrated in mother's milk.(26) After smoking seven or more cigarettes, wet nurses gave milk that contained demonstrable nicotine after four to five hours, but less in the urine. No effect was observable in the nursing infants or on lactation.

DENICOTINIZING TOBACCO.—Oxidation is depended upon to a certain extent to get rid of the nicotine in tobacco. A study (20) along this line revealed that the oxygen required for the oxidation of nicotine depends upon the amount of nicotine present and that the rate of oxidation depends upon the temperature. The reaction reaches its maximum in the neighborhood of pH 7.6. Oxidation with H_2O_2 or activated carbon gives nicotine oxide. Hydrocyanic acid and urethan retard the oxidation of nicotine.

Two denicotinizing fluids were examined,(22) one called "Nikoton" and the other "Bonicot." Both are clear, colorless fluids. "Nikoton" consists essentially of aromatic distilled water possessing no denicotinizing action whatever. In order to function properly, according to the manufacturer, a drop of the liquid is applied to the end of a cigar or cigarette. "Bonicot" showed it contained ferrous ammonium sulphate, tartaric acid and dilute sulphuric acid. Any advantageous use of this product is questioned. Another investigator (36) corroborated the above findings. Tests (39) of substances to be inserted in the tips of cigarettes to absorb nicotine have failed to

substantiate fully the manufacturers' claims. Of two British patents (42 and 43) with claims for denicotinizing tobacco, one is interesting in that it relates to a substance consisting of (1) ferrous, or aluminum sulphate, or other substance which on heating will liberate a substance, *e. g.* SO_3, that combines with the nicotine; (2) a binding material such as 20 parts of ethyl cellulose in 80 parts of CCl_4, and (3) an oxidizing agent (KNO_3) which will prevent the formation of SO_2 from SO_3. Nitrocellulose may serve both as a binder and an oxidizing agent. Thin rods of the dried compressed compound are inserted in cigar, cigarette or pipe. A United States patent (46) previously mentioned employs a chemical intended to alleviate irritation of tobacco when smoked.

In the United States there is at least one brand of tobacco (47) put up as pipe, cigarette, and cigar tobacco for which it is claimed, with certification by a reputable consulting laboratory, that nicotine has been removed, with less than 1 per cent. remaining. No chemical data on this product is available. The cigars are said to smoke well, with the cigarettes "kickless."

In conclusion it may be repeated that all tobacco smoke contains some nicotine and that some of this is bound to get into the person's system, there to be eliminated at a rate in proportion to the vigor of the person and his vital organs.

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UNSUSPECTED COPPER IN DOMESTIC WATER SUPPLIES

By David Wilbur Horn, Ph. D.

THE *Drinking Water Standards* (1) adopted by the U. S. Treasury Department, June 20, 1925, for drinking and culinary water supplied by common carriers in interstate commerce, state: "Copper (Cu) shall not exceed 0.2 part per million." The purpose of the following is to recount two cases that have come under my observation in consulting practice, where the natural waters were free from copper but the water from the taps in the residences contained copper in excess of the Standard.

In the first instance a new water supply which I had examined and which was in excellent condition in the Fall of 1932, was, in the following June, reported as "blue". A minute azure deposit was found on one little used porcelain fixture, which deposit dissolved in "Household Ammonia" giving the deep blue of cuprammonium solutions. When tested with formaldoxime, (2) the cold water showed a little less than 0.2 parts per million of copper, and the hot water approximately ten times as much. A solution of this electrolytic deposit, matched up with standard solutions in a Duboscq colorimeter showed 1.5 parts per million of copper in the original hot water. Water from the well, before the water had entered the household supply system, gave entirely negative tests for copper with formaldoxime. This well is a large dug well about 16 feet deep located in the early Cambrian rocks of the Piedmont Plateau. The rocks in this part of Chester County, Pennsylvania, are largely gabbro. The pH value of this water was 6.4.

In the second instance the owner of the well suspected copper poisoning, particularly after the drinking of water first thing in the morning had been followed by vomiting. The cold water drawn during the day when there was frequent use made of water by the household showed almost 1 part per million of copper when tested with formaldoxime. Water that had lain in the pipes over night and that was drawn from the cold water tap first thing in the morning showed by the same test 4 parts per millon of copper. Water from the well, before the water had entered the household supply system, gave entirely negative tests for copper by the formaldoxime test. This well is a drilled well, 60 or more feet deep, located in the Coastal

Plane and probably in Tertiary rocks. It is within a short distance of the Cohansey Creek in Cumberland County, New Jersey.

The common feature in these two water supplies is the joint use of (1) a pump that pumps both water and air and that maintains a sufficient air pressure over the water to force the water throughout the piping system of the residence, and (2) a piping system of copper pipes. Unless the U. S. Treasury Standard for copper is too stringent, it would not be prudent to use unguardedly (3) this combination of air-water pump and copper pipe system. If it can in any instance be established by experiment in advance that the kind of copper under consideration is not dissolved even when sweated in with alloys at the joints and used with alloys in the fittings, and if it further can be assured in advance that the copper and alloys tested and specified will be throughout the copper and alloys actually installed, then perhaps little or no danger will attend the use of this combination of air-water pump and copper pipe system.

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"THE PAST AND FUTURE OF PHARMACY"*

By David Riesman, M. D., Sc. D.
Professor of the History of Medicine at the University of Pennsylvania Medical School

YOU have conferred a distinguished honor upon me in asking me to be your guest this evening. I have been bound by strong ties of friendship to the President of the Institution in which we are meeting and his promised presence here tonight was an additional magnet to bring me here. Dr. Krusen was my boss for eight years during his Directorship of the Health Department of the City. If he is as good a superior to you as he was to me, I call you lucky.

The name of your Society should awaken grateful thoughts in every medical man for Claudius Galen in the medical heaven sits at the right hand of Hippocrates, the Father of Medicine. Galen's influence upon medicine can hardly be conceived today—for more than twelve hundred years his word was the law and the prophets of medicine—no author whose authentic writings we possess has enjoyed a comparable influence.

Your branch of science is nearly as old as ours and goes back far beyond Galen. Precise directions for compounding medicines are found in the Ebers papyrus, the second oldest medical record we possess. I saw this famous papyrus a number of years ago in its glass case in the University of Leipzig. According to some interpreters pharmacists are mentioned in the Bible. The first real materia medica written as such came from the pen of Dioscorides, a Greek army surgeon under the infamous Nero. The Middle Ages produced many pharmaceutical books known as Antidotaria, some of which passed through innumerable editions. It is interesting that in the twelfth and thirteenth centuries strict laws were made in the two Sicilies by King Roger and afterwards by that superman Frederick II, Emperor of the Holy Roman Empire, to control the practice of pharmacy. A real N. R. A. code was put into force fully six hundred years ago. In this same code it was ordered by Frederick that no doctor should make any fee-splitting arrangement with a pharmacist. You will note that human nature is very much the same in all ages.

A pharmacy in the Middle Ages was a marvelous place with its beautiful porcelain jars containing drugs—mineral, vegetable and ani-

*An Address delivered by invitation to The Galen Pharmaceutical Society, held in the Auditorium of the Philadelphia College of Pharmacy and Science, May 29, 1934.

mal—from all the known quarters of the globe, with its retorts, furnaces and bellows.* Perhaps under a lock and key the apothecary kept the miracle-working bezoar, the antidote against all poisons and the panacea for all ills. The bezoar as you know was either a hairball from the stomach of a ruminant or a mythical stone from the head of a stag or other animal. It commanded a fabulous price and was therefore chiefly used in the treatment of kings and of princes of the Church. Sometimes water in which the bezoar had been placed was shipped long distances to cure a wounded knight. The great price of the bezoar eventually led to falsification, particularly in France. In exposing these frauds a writer coined the phrase still in use by a well-known chocolate manufacturer, "Se mefier contrefacons".

The medieval and later pharmacists constituted a powerful guild which in Florence was united with that of the physicians, painters and poets. Dante belonged to this variegated guild. Another distinguished member was the apothecary Matteo Palmieri, poet and ambassador. The ambassador, says a quaint old historian—Giovanni Battista Gello—behaved himself so wisely and "the King did aske what manner of man he was in his own countrey, and it was told him that he was an Apothecary." "If the Apothecaries," quoth the King, "be so wise and learned in Florence, what be their physicians?"

Polypharmacy, the hall-mark of the Middle Ages, reached unbelievable degrees; for example the famous Theriacum of Nuremberg was composed of seventy-two ingredients and took three months to prepare. When it was finished a public holiday was declared. It is worth mentioning that our present use of liver and other animal extracts is a return to medieval practice when animal organs and even excreta constituted an important part of materia medica. I am inclined to believe that barring some noteworthy exceptions our use of such preparations has little more scientific basis than it had in the Middle Ages. We may laugh at those bygone days but I am quite sure that later-coming generations will also laugh at our own naïveté.

Medieval towns had their botanical gardens for supplying fresh drugs to the pharmacists. Such a garden existed as early as the ninth century in the famous cloister of St. Gall in Switzerland.

In the great University of Paris the pharmacists were under the patronage of the Faculty of Medicine and had to swear a lengthy oath which was as follows:

*A very fine collection of such jars is shown in the Lecture Room of Dr. Martin Fischer in the University of Cincinnati.

1. To respect and honor the doctors of medicine and the masters of pharmacy.

2. Never to speak ill of the doctors and masters.

3. To do everything possible for the glory, ornamentation and majesty of medicine.

4. Never to teach idiots or ingrates the secrets and rarities of it.

5. Never to give a purgative to anyone with an acute disease without a doctor's advice. This part of the oath is of extraordinary interest since it shows that medical men hundreds of years ago were aware of the dangers of purgation in certain acute diseases. This was long before appendicitis and the possibility of rupture of the inflamed appendix after the administration of a purge were known to medical science. The same injunction given by the University of Paris has recently been widely circulated and for the same reasons by the Philadelphia County Medical Society.

6. Never to touch the private parts of females except in cases of great necessity.

7. Never to give a poison to anyone nor counsel any one to give a poison, not even to his greatest enemies.

You may remember that in Shakespeare's play, Romeo and Juliet, the apothecary refuses to give a poison because the penalty is death for him who utters it.

8. Never to give an abortifacient.

9. To disavow and to flee like the plague all charlatans and not to keep bad or old drugs in my shop.

In large measure the intense commercial rivalry of such medieval cities as Amsterdam, Venice, Lisbon, was due to the great profits accruing from the drug and spice trade. How the traffic was carried is shown best in Masefield's exquisite poem "Cargoes":

Quinquirme of Nineveh
From distant Ophir
Rowing home to harbor
In sunny Palestine
With a cargo of ivory
Apes and peacocks
Cedar wood, sandal wood,
And sweet white wine.

Venice controlled most of the drug and spice trade until Vasco da Gama by doubling the Cape of Good Hope inaugurated the over-

seas route to India and the Far East. That spelled the doom of the Queen of the Adriatic as a great seaport.

In this country in the early period there were few pharmacists, the majority of physicians putting up their own preparations.

John Morgan, founder of the Medical School of the University of Pennsylvania, seems to have been the first to break with this custom. He brought with him a London pharmacist, a Mr. Leigh, to compound his prescriptions. As he was also the first to charge a fixed fee for his services and to carry a silk umbrella, the other Philadelphia doctors looked upon him as a dangerous revolutionary.

What about the position of the pharmacist today? It would appear that he has to some extent relinquished his place as the doctor's right-hand man and as a true scientist engaged in exploring new fields. The research part of his art has been taken over by the great pharmaceutical houses. Much as we may lament this, we cannot help but approve of some of the results. Nor would I blame the modern druggist for branching out into the ownership or management of a department store. It is a phase of the industrial revolution that began nearly a hundred years ago.

A fact of tremendous importance is the tendency on the part of physicians to use fewer and fewer drugs. This so-called therapeutic nihilism came in with the Johns Hopkins school and went to extremes. When Osler said that all that was needed to treat disease was nux vomica and hope, he did much harm in that he fostered an indifference to the study of materia medica and pharmacology. On the other hand, by inaugurating a reaction from the medieval polypharmacy that had come down to the late 80's and early 90's of the last century, he rendered a definite service to medicine and to the stomachs of our patients.

In my early days many druggists did the little laboratory work required in medical practice, simple urine and, more rarely, blood examinations. Should the modern druggist keep pace with the demands of the laboratory and continue to render that traditional service now so much enlarged? I do not think this is possible. Clinical laboratory work is a definite specialty requiring costly equipment, highly technical training and undivided time. Although the work itself is often done by women technicians—a new species of the female of the genus Homo—it has to be supervised by one who can give it his whole attention.

A word about patent medicines. In all civilized countries but especially in America the use of patent medicines is a growing evil.

It has lessened the importance of pharmacy in the life of the people. Department stores and even country and chain stores now carry many medicinal articles that are sold over the counter. For the enormous growth of the patent medicine business, the manufacturers with their ubiquitous detail men are largely responsible, but the gullibility of doctors and of the public is a not unimportant factor. The greater ease of writing a single word instead of composing a prescription also plays a role. I do not see at the moment what can be done to stop the further progress of the patent medicine habit; perhaps education of the public and of the doctor himself may eventually check it in some degree.

The pharmacist of today is a versatile individual. He is a business man and a scientist and a very hard worker. As such he is worthy of his hire and of the respect of the community. While the nature of his activities has undergone a great change there still exist for him many important duties and valuable opportunities for useful service. In addition to the need of knowing the drugs that enter into the doctor's prescriptions he has before him the expanding field of the biological preparations. There is no reason why he should not in co-operation with physicians undertake some type of modest research —in bacteriology, in pharmacology. The great Pettenkofer was a registered apothecary before he became one of the great bacteriologists and sanitarians.

In the field of biological preparations the scientifically trained and ambitious pharmacist—trained as he is in this College—can find abundant scope for interesting and not unprofitable research. An apothecary who understands something of antitoxins, vaccines, serums and proteins will not only be better equipped to handle these modern preparations and by that token be more useful to the physician, but he will himself derive much satisfaction from knowing "what it is all about". And when he once understands this subject in an adequate manner he may be able to undertake the preparation of some of the important substances and may even with his chemical knowledge attempt their analysis or their synthesis. I can see vast fields opening before the enthusiastic young pharmacist of the present day provided of course that the ordinary business activities leave him enough time and strength for scientific work.

And now, gentlemen, in closing I salute you as members and alumni of a school of pharmacy that has the highest reputation in the land as a real home of science. Be true to its traditions.

SCIENTIFIC AND TECHNICAL ABSTRACTS

Compiled by Arthur Osol, Ph. D.

Calcium Gluconate. L. Sollazzo. *Scienza farm. 1,* 109-15 (1933); *Chimie & industrie, 13,* 623-4. Through *Chem. Abstracts 28,* 3526 (1934). A brief review of the preparation and properties of calcium gluconate, more particularly from the pharmaceutical standpoint. A 10 per cent. solution which will not crystallize out may be obtained as follows: Dissolve one gram of boric acid in 90 cc. of hot water and then 10 grams of calcium gluconate, boil a few seconds, cool, make to 100 cc., filter under suction, put up into ampules and sterilize at 120 degrees C.

Solutions of Adrenaline in Oil. R. Tuffi. *Scienza farm., 1,* 36 (1933); *Chimie & industrie, 31,* 624. Through *Chem. Abstracts 28,* 3526 (1934). As aqueous solutions of adrenaline hydrochloride are immiscible with mineral and vegetable oils, it is impossible to prepare properly an aqueous 0.1 per cent. solution of adrenaline hydrochloride in olive or paraffin oil, which is sometimes prescribed. A solution of the base in oil can be prepared as follows: The base is treated on the water bath with a few drops of oleic acid; the excess oleic acid dissolves perfectly the oleate which is probably formed, and this solution can be added to vegetable or mineral oils.

The Determination of Mercury in Pharmaceutical Preparations. F. Reimers. *Arch. Pharm., 272,* 546-59 (1934). Spacu and Suciu have developed a method for the determination of mercury which depends upon the precipitation of the latter as a complex salt. This complex has the formula $[Cu(NH_2CH_2CH_2NH_2)_2]HgI_4$ and is obtained quantitatively when a neutral or slightly alkaline solution of the mercury salt reacts with potassium iodide and a diethylenediamine-cupric salt. The underlying equations are as follows:

$$Hg^{++}+4I^{-}=HgI_4^{-}$$

$$HgI_4^{-}+Cu(NH_2CH_2CH_2NH_2)_2^{++}=[Cu(NH_2CH_2CH_2NH_2)_2]HgI_4$$

As Spacu and Suciu apparently did not investigate the method thoroughly, Reimers has undertaken to determine the conditions of precipitation and the applicability of the method to the determination of mercury in pharmaceutical preparations.

The method developed by Reimers requires the use of the following solutions:

(1) Potassium Iodide Solution, 2 molar (33 g. in 100 cc.).

(2) Copper Sulphate Solution, 0.5 molar (12.5 g. $CuSO_4.5H_2O$ in 100 cc.).

(3) Ethylenediamine Solution, 0.5 molar.

Solution (3) is prepared from ethylenediaminehydrate by mixing 20 grams with 480 cc. of water, determining the concentration by titration with normal HCl (methyl red indicator) and adjusting to 0.5 molar concentration.

The diethylenediaminecupric sulphate solution is prepared by mixing 20 cc. of solution (2) with 80 cc. of solution (3) and 100 cc. of water. The resulting solution is therefore 0.05 molar with respect to copper and 0.2 molar with respect to ethylenediamine (twice the concentration theoretically required). In order to precipitate 0.1 gram of mercury (0.5×10^{-3} mole), the following quantities of reagents are theoretically necessary: 1 cc. of potassium iodide solution and 10 cc. of the diluted copper solution. In the actual determination the solution in which precipitation is being conducted should contain at least 0.5 per cent. of potassium iodide (in excess of that required for the complex) and an excess of 10 cc. of the diluted copper solution for each 100 cc. of liquid.

The determination is carried out as follows: To the neutral solution which contains approximately 0.2 gram of mercury salt (mercuric chloride) in a volume of 100 to 200 cc. add the required quantity of potassium iodide solution and heat nearly to boiling. To this add the boiling solution of diethylenediaminecupric sulphate, stir, cool with running water and filter the supernatant liquid through a tared porcelain filtering funnel. The precipitate is transferred to the funnel with the aid of a solution containing 3 cc. of 2 molar potassium iodide and 100 cc. of the diluted copper solution diluted to 1 liter with water. The precipitate is washed several times with this solution, then three or four times with alcohol and finally three or four times with ether. The crucible is carefully dried after which it is placed in a vacuum desiccator for ten minutes and finally weighed. The weight of the

precipitate multiplied by 0.2249 indicates the weight of mercury in the precipitate.

Reimers has applied this method with excellent results to the determination of mercury in mercuric chloride tablets, in plasters and in various ointments (mercuric oxide, ammoniated mercury, calomel, metallic mercury). In ointments, the base is dissolved in a suitable solvent (a mixture of ether, petroleum ether and acetone, for example) and the mercury is subsequently converted to a mercuric salt by digestion with a mixture of nitric and sulphuric acids in a suitable flask.

Syrup of Tolu. The development of an unpleasant odor (usually stated to resemble that of coal-gas or benzene) in this syrup has been reported from time to time. According to Oliviero (*J. Pharm. Chim.*) the trouble is caused by a fungus which acts on cinnamic acid with the production of cinnamene, the substance responsible for the odor. Aspergillus niger and Penicillium glaucum will produce this reaction, and possibly other related molds. Oliviero found that the smell was noticeable almost immediately when a filtered culture of Aspergillus was shaken with a solution of sodium cinnamate. (*The Pharmaceutical Journal 132,* 509, May 12, 1934.)

The Qualitative Separation of Antipyretics. K. Reber and A. Burgin. *Schweiz. Apoth. Ztg., 72,* 209 (1934), through *Squibb Abstract Bull., 7,* 751 (1934). A mixture consisting of approximately 50 per cent. antipyrine, 40 per cent. acetanilid, 10 per cent. caffeine was analyzed qualitatively, and the constituents identified by their melting points. Antipyrine was separated by the formation of the picrate by the addition of 1 gram of picric acid dissolved in 10 cc. of 95 per cent. alcohol to 1 gram of the mixture dissolved in 100 cc. of water and 5.0 cc. hydrochloric acid. The picrate melted at 188-189 degrees C. Antipyrine obtained from the picrate and crystallized from toluene was identified by its melting point of 113 degrees C. Acetanilid and caffeine were then separated by their difference in solubility in ether and chloroform. Acetanilid dissolved in ether and after recrystallization melted at 115 degrees C. The caffeine dissolved in chloroform was recrystallized from alcohol and melted at 235 degrees C.

Another mixture consisting of approximately 50 per cent. phenacetin, 20 per cent. methylacetanilid, 15 per cent. caffeine and 15 per cent. dimethylaminoantipyrine, was dissolved in water and acidified with tartaric acid. When cooled, most of the phenacetin separated and crystallized from hot water had a melting point of 135 degrees C. The acidified filtrate was shaken with 10 cc. petroleum ether, from which crystals of methylacetanilid, melting point 102-104 degrees C. were obtained. Caffeine, melting point 234 degrees C., was extracted from the tartaric acid solution by shaking with chloroform, distilling and crystallizing from absolute alcohol. Dimethylaminoantipyrine, melting point 108-109 degrees C., was separated from the alkaline solution with ether, after which the ether was distilled and the solid crystallized from hot water.

Isotonic Solutions. H. Treves Brown. *Pharm. Journal, 132,* 633 (June 16, 1934). In a previous contribution the writer has shown that the amount of a substance, such as sodium chloride, which must be added to a solution in order to render it isotonic with blood serum, may be calculated from the formula

$$\frac{n\,m}{M} + \frac{n'\,m'}{M'} = \frac{2 \times 0.9 \times V}{100 \times 58.5}$$

where

V = volume of solution required
m = weight of substance prescribed
M = molecular weight of substance prescribed
n = number of ions yielded by each molecule
n′, m′ and M′ are the corresponding figures for the substance to be added to secure isotonicity.

A similar formula holds good for solutions required to be isotonic with the lachrymal solution, except that 1.4 must be substituted for 0.9. It was pointed out that the practical difficulty involved in the application of this formula in dispensing arose from lack of information as to the values of n and n′ for a considerable proportion of the substances used in pharmacy. Accuracy is attainable by adjusting the freezing-point of the solution to —0.56 degrees C. (the freezing-point of blood serum) or —0.86 degrees C. (the freezing-point of the lachrymal solution) or by adjusting some other physical property

connected with osmotic pressure. Such a procedure is impracticable for dispensing purposes. However, from a table of freezing points of the solutions of the chemicals in question one may calculate the quantity of added substance necessary. A table given in the new Swiss Pharmacopœia is reproduced in this paper and several examples are explained. Treves proposes the following formula for calculating the weight W, of the adjusting substance to be added to a hypotonic solution in order to make it isotonic with blood serum:

$$W = \frac{0.56 - a}{b} \text{ per cent. w/v.}$$

where

a denotes the freezing point of the prescribed solution in degrees below 0 degrees C. and b denotes the depression of freezing point of water produced by 1 per cent. w/v of the adjusting substance.

The Evaluation of Medicinal Charcoal by the Antipyrine Method. Von C. Rohmann and U. Rohmann. *Pharm. Ztg., 79,* 122 (1934). Through *Pharm. Zentralhalle, 75,* 367 (1934). The authors recommend the following method: A 0.5 gram portion of the dried, or an equivalent quantity of moist, charcoal is placed in a 200 cc. glass-stoppered flask containing 100 cc. of a 0.5 per cent (w/v) aqueous solution of antipyrine. After shaking for ten minutes the solution is filtered through a dry filter, the first 20 cc. being discarded. From the remaining solution a 25 cc. portion is pipetted into a glass-stoppered Erlenmeyer flask. To this solution are added 1.5 to 2.0 grams of sodium acetate and 20 cc. of 0.1 normal iodine solution after which the stoppered flask is allowed to stand for twenty minutes. The precipitate is dissolved by the addition of 20 cc. of alcohol and the excess iodine is determined by titration with 0.1 normal sodium thiosulphate. At least 12.7 cc. of thiosulphate should be required corresponding to a maximum of 7.3 cc. of iodine required by the antipyrine not absorbed and corresponding to the absorption of not less than 0.0564 gram of antipyrine by 0.125 gram of charcoal (1 cc. of 0.1 normal iodine is equivalent to 0.0094 gram antipyrine).

SOLID EXTRACTS

"Using all but the pig's squeal" was once a stockyard stock phrase. And now comes the petroleum chemist to go the stockyard one better in the matter of efficiency, for he has recently harnessed for use the offensive odor of natural gas. The mercaptan family of chemicals is largely responsible for these bad smells and by separating them out not only is the quality of gas improved, but the mercaptans made available. These are sold to producers of manufactured gas who introduce them in their product as a warning odor. Leakage of poisonous city gas is thereby readily detected, and suicide by city gas becomes unpleasant and therefore an unpopular death.

"Girth-control" is still a pastime of American womanhood, and those who would be slender subsist on slender fare. Food that fools the appetite, but fails to feed the flesh, is very much demanded. And the most recent examples of such are the salad oils made from petroleum. "Nujol" salad dressing, and "Squibb's" Mineralaise may thus combine a culinary claim with a quaint and calm catharsis.

Five-day-old flies of the domestic variety are the "test animals." The locale of the test is known as the insectary. The material under test is one of any number of the so-called fly-killing sprays. The flies are cajoled or pushed into the test chamber, which has certain definite dimensions, and a measured amount of the spray is atomized into the air of the insectary. To pass this "Peet-Grady test," 95 per cent. of the flies must quit flying and fall to the floor within five minutes and 60 per cent. of them shall remain prostrate forevermore.

Sitting in a corner at sixty, rocking away to the tune of cracking arteries, is one of the penalties of too active an existence. Calcium deposits in the blood vessels are charged with this disease of the senile, yet milk with all of its calcium is still pronounced by some the food ideal for the old as well as the very new.

Trade and Mark, the merry Smithsters, have had a bit of wind taken out of their sales—for news has just been broadcast that vitamin A is not a preventive of coughs and common colds. Two hundred medical students, nurses and hospital staff physicians of Cleveland turned themselves into human guinea pigs in order to settle the question whether vitamin A, sometimes called the anti-infective vitamin, really could help ward off such infections as the common cold.

At the meeting of the American Medical Society, Dr. Gerald S. Shibley and Dr. Tom D. Spies of Cleveland reported the results of the experiment. Evidence indicated that while the vitamin might shorten the duration of a winter cold by two or three days, it did not keep the experimental group from having as many colds as usual. Neither did it lessen the severity of the colds.

Tonsillectomists take heed! for here is bad news for those who feel that their inclusion in the anatomic landscape was a godly or ungodly mistake, and that every tonsil should be torn from its throaty mooring.

Tonsils appear to be part of the mechanism by which the body defends itself against disease during infancy and childhood, Dr. Lee Wallace Dean, professor of otolaryngology at Washington University Medical School, St. Louis, pointed out at the recent meeting of the American Medical Association.

The question of whether to take them out or leave them in consequently depends on whether the good of their natural function is overbalanced by the infection that may be located in them. No definite rules can be given on the subject of removing them. Each case must be decided on its own merits.

Mothers, whose sense of esthetics exceeds their sense of duty, should read and reason the following report. Mother's milk is the means to further reduction of the death rate among American babies, Drs. Clifford Grulee, Hayworth N. Sanford and Paul H. Herron, of Chicago, told members of the American Medical Association. They based this opinion on a study of 20,000 Chicago babies.

The mortality for these infants was ten times higher among those artificially fed than among those fed by their mothers in the natural manner, the baby specialists found.

The success of artificial feeding of infants during the past few years has made it seem that the prepared baby's foods can safely replace mother's milk, but there is no scientific proof of this, Dr. Grulee and associates declared.

Gassed oranges are now a commonplace commodity. Firstly, they were gassed with ethylene to speed their ripening color changes—and now we are told that if oranges are subjected to a new kind of protective gas attack, storage damage from decay is reduced to half or quarter of the usual losses.

The gas used by Dr. L. J. Klotz, of the University of California's Citrus Experiment Station at Riverside, Calif., is nitrogen trichloride. It promises to combat decay-causing fungi upon citrus fruits in storage rooms or in loaded cars of packed fruits.

"A beautiful figure need no longer be a matter of birthdays," says the label of "Stardom's Hollywood Diet," which also asserts: "The possibility of your having an exciting type of Hollywood figure is now so real as to be actually breath-taking, and to gain it you won't have to go hungry, engage in violent exercises, use drugs or resort to laxatives; all these methods are taboo."

Promptly the Federal Food and Drugs officials seized it, examined it, confiscated it. The so-called diet consisted essentially of sugar, soya bean flour, cocoa and table salt, and was marked to retail at two dollars for a seven-ounce package.

Barnum's aphorism still prevails.

THE ONE HUNDRED AND TWELFTH ANNUAL COMMENCEMENT OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE

THE one hundred and twelfth annual commencement was held in the college auditorium, the evening of June 6th, in the presence of an audience which filled the room to capacity. The invocation was pronounced by the Rev. O. R. Williams, pastor of the first Welsh Presbyterian Church in Philadelphia. Candidates for degrees were presented to President Wilmer Krusen by Dean Charles H. LaWall. Degrees in course in pharmacy, chemistry and bacteriology were conferred upon 162 students.

The degrees of Master of Pharmacy (*honoris causa*) were conferred upon the following:

Dr. Walter A. Bastedo, president of the United States Pharmacopœial Convention and member of the U. S. P. XI Revision Committee, a prominent New York physician and medical educator and author.

Dr. Horatio C. Wood, Jr., for many years professor of pharmacology in this college and professor of pharmacology and therapeutics in the school of medicine of the University of Pennsylvania. Dr. Wood is the author of medical and pharmaceutical textbooks in use throughout the world.

Edmund N. Gathercoal, professor of pharmacognosy at the College of Pharmacy of the University of Illinois in Chicago. He is chairman of the N. F. VI Revision Committee and of the National Pharmaceutical Research Conference.

Dr. Oscar W. Bethea, professor of clinical medicine in the School of Medicine of Tulane University, New Orleans, and professor of therapeutics in the Graduate School of Medicine of that institution. Dr. Bethea is chief of staff of the Baptist Hospital, New Orleans, and on the staff of many other hospitals there. He is a medical author of wide fame.

Dr. Bethea delivered the commencement address† to the graduating classes. Degrees, certificates and prizes were awarded as follows:

MASTER OF PHARMACY (Honoris Causa)

Walter A. Bastedo	Horatio C. Wood, Jr.
Oscar W. Bethea	Edmund N. Gathercoal

† Printed elsewhere in this issue.

MASTER OF SCIENCE IN CHEMISTRY

Richard E. Houghton

MASTER OF SCIENCE IN BACTERIOLOGY

Morton R. Cohen

BACHELOR OF SCIENCE IN CHEMISTRY

William G. Batt
Myles W. Edwards
Russell A. Faust
William Hand
John W. Heisler
George E. Keller
Harry Mack
Stephen A. Matuska
William L. McClintock, Jr.
Bernard Melkon
Henry W. Moyer
William H. J. Nussle
Louis A. Reber
Nathan Rubin
Frederick W. Schreiber
Louis S. Staple

Norman Uranson

BACHELOR OF SCIENCE IN PHARMACY

Dorothea K. Best
Silvio D. Ciancarelli, Jr.
William E. Earl
Gulielma G. Given
John M. Goodyear
Margaret L. Hershey
Morris Lieberman
James T. McCann
John W. Messick, Jr.
Bertha Mueller
John M. Muroff
Albert G. Pacenta
Ruth Rich
Joseph M. Richman
Charles Riffkin
Aaron D. Romig
Frederick R. Schrey
Edward J. Schwalb
George W. Sloan
George F. Truitt
Martin S. Ulan
Paul W. Wilcox

BACHELOR OF SCIENCE IN BACTERIOLOGY

Muriel F. Brook
Donald C. A. Butts
Edmund P. Finch
Walter E. Jones
Elizabeth C. Sammis
Samuel A. Zapol

PHARMACEUTICAL CHEMIST

Lee G. Cordier
Carlton E. Cutler

Joseph F. Oakley

RECOMMENDED FOR THE DEGREE OF GRADUATE IN PHARMACY

Joseph A. Altieri
Robert W. Balin
Morris K. Barkan
Dominic R. Belcastro
Joseph Bell
Carl Bennett
Ralph W. Biddle
Noah S. Blank
Edward Blatt
Louis Blavat
William J. Blewett
Martin Bloch
Frank J. Brady
Lewis J. Bramer

Louis Brodsky
Aniello C. Buccino
Frank Cario
Albert J. Chiola
Gertrude Cohen
Harold W. Cohen
Maurice B. Cohen
Sol R. Collier
James V. Connell
Arland B. Cooke
Clyde D. Cooper
Leon M. Czajkowski
Horace L. Dancy
Burton T. Davies
Thorpe T. Dawes
Frank R. DeLucco
Adolph R. DiDario
Howard A. Dietrich, Jr.
John S. DiGildo
Sidney M. Doroshow
Edwin B. Dunham
Harry W. England
Louis Esrick
Benjamin Finer
Armand A. Fiorani
Sigmund Fox
Willard H. Freed
Mildred V. Garrell
John Gasper
Abraham A. Gordon
Jack Gorsen
Irving W. Graff
Solomon W. Greenberg
George H. J. Grove, Jr.
Thomas W. Grudkowski
Norbert A. Gustitus
Walter A. Haas
John R. Hallock
Morris Harrison
Augustus W. Holwig
Robert B. Hoover
Samuel D. Hutchison
Evan A. Jones
Isabella Kaczmarczyk
Louis Kalich
Elias Kanter
Martin Katz
Anthony M. Killeri
John Kneser
William Kramer
Harry A. Kurtzman
Lloyd D. Learn
Harold W. Leininger
George H. Levine
Dolores E. Lorenzoni
Jacob S. Ludwig
Leonard P. Lukas
William J. Luksic
Edward A. Mangold
Patrick A. McLaughlin
Jerome A. Menne
Bernard Mocenter
Morris L. Mogilefsky
Manuel M. Motis
Alex J. Munn, Jr.
Edward G. Obrzut
Leonard G. Parks
Ronald O. Perris
Thomas C. Pitt
Joseph D. Plotnick
Pierce I. Quesinberry
Manuel Raubfogel
Joseph D. Reses
James G. Roenitz
Charles H. Rosenfeld
Charles M. W. Russell
Domenick J. Russo
Saul H. Savitz
Humbert S. Serri
Agnes M. Shannon
Joseph J. Shiner
Ralph Shoostine
Bernard Shuster
Jacob Siez
Verne W. Smith
John N. Soltis
Stephen A. Sporinsky
Ludwig H. Stocker
Leo F. Stoltz
Harvey V. Stouffer

Thomas M. Tresse
Eugene Tuzinski
Edward A. Ward
Donald O. Wilson
Irvin Yudelson
Louis A. Zedd
Harry S. Zucher
James L. Wilson

CANDIDATES WHO HAVE COMPLETED SPECIAL COURSES AND HAVE QUALIFIED FOR CERTIFICATES

(This does not include students who completed courses in these subjects for credits for a degree.)

Certificates in Bacteriology

Hildegard S. Singles
Pauline L. Rieser

Cerificates in Clinical Chemistry

Jennie A. Kieronski
Hildegard S. Singles

AWARD OF PRIZES

Graduates in Pharmacy (Ph. G.)

Designated as "Distinguished"
With General Average Over 90%

Robert W. Balin
Gertrude Cohen
James V. Connell
Mildred V. Garrell
Harry A. Kurtzman
Jacob S. Ludwig

Designated as "Meritorious"
With General Average Between 87% and 90%

Frank J. Brady
Harold W. Cohen
Arland B. Cooke
Clyde D. Cooper
Irving W. Graff
Edward A. Mangold
Manuel M. Motis
Pierce I. Quesinberry
Saul H. Savitz
Agnes M. Shannon
Jacob Siez
Ludwig H. Stocker
Thomas M. Treese
Edward A. Ward

The Procter Prize, a gold medal for the highest average of the class, is awarded to:

Mildred V. Garrell

The William B. Webb Memorial Prize, twenty dollars and a bronze medal for the highest general average in the branches of Operative Pharmacy, Analytical Chemistry and Pharmacognosy, is awarded to:

Gertrude Cohen

Honorable Mention to

Robert W. Balin
Mildred V. Garrell
Harry A. Kurtzman
Jacob S. Ludwig
Pierce I. Quesinberry
Ludwig H. Stocker

The FRANK GIBBS RYAN PRIZE, a gold medal endowed by the Class of 1884, as a memorial to their distinguished classmate, for the best average in the Chemical and Pharmaceutical Laboratory Courses, is awarded to:

JACOB S. LUDWIG

Honorable Mention to

Robert W. Balin
Gertrude Cohen
James V. Connell
Mildred V. Garrell
Harry A. Kurtzman
Ludwig H. Stocker

The MAISCH BOTANY PRIZE, a special prize of twenty dollars is gold, offered by Sinclair S. Jacobs of the Class of 1909 to the member of the graduating class who shall have presented the best herbarium collection of plants, or the best thesis on the microscopical structure of medicinal plants, divided between

Harry Mack and Frederick W. Schreiber.

The REMINGTON MEMORIAL PRIZE, twenty dollars, offered by the Estate of Joseph P. Remington, for the highest average in the examination of Operative Pharmacy and Dispensing, is awarded to:

LUDWIG H. STOCKER

Honorable Mention to

Robert W. Balin
Gertrude Cohen
George H. J. Grove, Jr.
Jacob S. Ludwig
Leonard G. Parks
Aaron D. Romig
George W. Sloan

The MAHLON N. KLINE THEORETICAL PHARMACY PRIZE, $50.00 in cash, offered by the Mahlon N. Kline Estate, for the highest average in Theory and Practice of Pharmacy, is awarded to:

JAMES V. CONNELL

Honorable Mention to

Robert W. Balin
Mildred V. Garrell
Irving W. Graff
Elias Kanter
Martin Katz
Jacob S. Ludwig
Edward A. Mangold
Manuel M. Motis
Manuel Raubfogel
Saul H. Savitz
Bernard Shuster
Jacob Siez
Ludwig H. Stocker
Edward A. Ward
Irvin Yudelson

The FREDERICK WILLIAM HAUSSMANN MEMORIAL PRIZE of one hundred dollars, given to the Pharmacy student with the highest average for the last three years of the course, is awarded to:

MILDRED V. GARRELL

Honorable Mention to

Robert W. Balin
Gertrude Cohen
Jacob S. Ludwig

The LAMBDA KAPPA SIGMA PRIZE, a Sorority Key, to the Sorority member in the Ph. G. Class attaining the highest average during the Senior year, is awarded to:

MILDRED V. GARRELL

And the Sorority Key to the member making the highest average in the Senior year of the Bachelor of Science Course, is awarded to:

MARGARET L. HERSHEY

Gold Medals awarded by the Alumni Association to the student of the Ph. G. Class and to the student of the B. Sc. Class who attain the highest scholastic averages, are awarded to:

Ph. G. .....MILDRED V. GARRELL
B. Sc. .....HARRY MACK

Prize offered by THE WOMEN'S AUXILIARY OF THE DAUPHIN COUNTY PHARMACEUTICAL ASSOCIATION to the girl graduating with the highest average:

MILDRED V. GARRELL

SHARP AND DOHME WINDOW PRIZES

$25.00, 1st Prize to

Walter A. Haas — Pierce I. Quesinberry

$15.00, 2d Prize to

Gertrude Cohen — Isabella Kaczmarczyk

$10.00, 3d Prize to

Morris K. Barkan — Carl Bennett

Louis Blavat

Honorable Mention to

Dominic R. Belcastro — Gulielma G. Given
Adolph R. DiDario — Dorothea K. Best
Edward G. Obrzut — Frank Cario